

A Low Noise 64x64 Germanium Array for Far IR Astronomy, Phase I

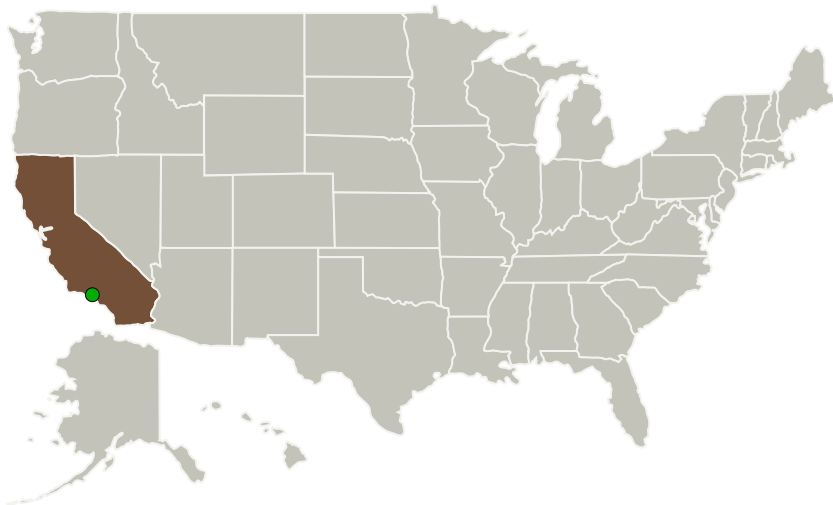


Completed Technology Project (2012 - 2012)

Project Introduction

We propose to investigate the feasibility of developing a 64x64 far infrared germanium focal-plane array with the following key design features: 1- Four top-illuminated, 32x32 germanium sub-arrays will be tiled together to form a 64x64 mosaic array. Germanium offers very low noise and proven performance in the 50-140 μ m range. 2- The array will use four SB349 CTIA readout multiplexers which are manufactured using advanced cryo-CMOS process. The unit-cell design is optimized for far IR detectors, eliminates detector debiasing, and improves pixel uniformity. The readout is operational down to at least 1.6K. 3- A novel, layered-hybrid design using planar bump-bond technology will be employed to assemble the focal plane. This integrated design offers superior noise performance and effectively addresses the readout glow, detector heating, and thermal mismatch between the detector and the readout. In addition to the large format, this is the key discriminator of this project. This is by far the largest far IR photodetector array produced with projected sensitivity of $\leq 1 \times 10^{-18}$ W/ $\sqrt{\text{Hz}}$. This effort fits well within the scope of the SBIR Subtopic S4.01 and will be a benefit to advanced instrumentation of NASA's astronomical missions, in particular SOFIA.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
TechnoScience Corporation	Lead Organization	Industry	Palo Alto, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California

Project Transitions

**February 2012:** Project Start**August 2012:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140326>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TechnoScience Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

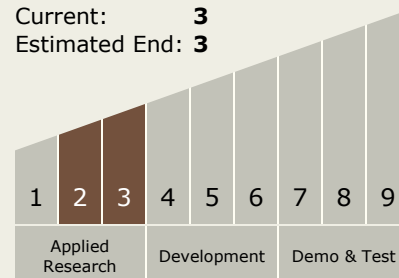
Carlos Torrez

Principal Investigator:

Jam Farhoomand

Technology Maturity (TRL)

Start: 2
 Current: 3
 Estimated End: 3



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Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System